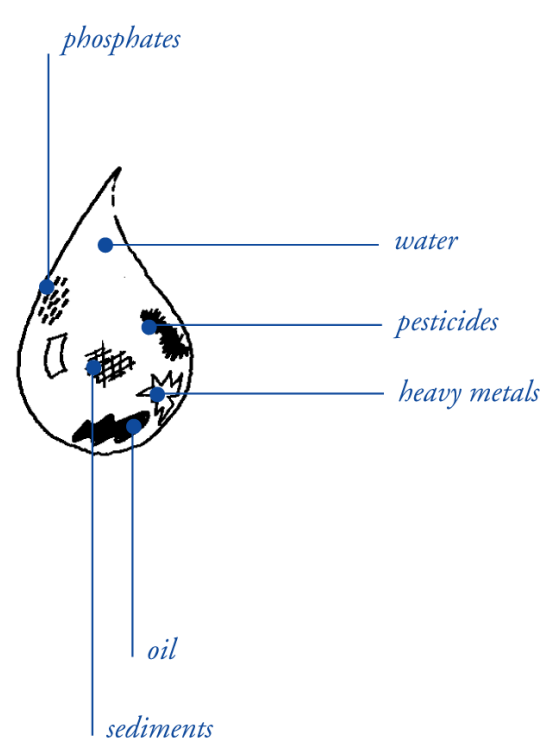


URBAN RUNOFF & "LOW-IMPACT DEVELOPMENT"

WHAT IS URBAN RUNOFF?

Urban runoff is the largest source of pollutants to the Bay. When it rains, pollutants (such as motor oil, tire wear, litter, fertilizers, pesticides, etc.) wash off of streets and parking lots. When urban runoff flows directly into a storm drain pipe and from a pipe into a body of water, like a creek or San Francisco Bay, the aquatic resource can be degraded.



Puddles in the gutter often reveal an oily sheen, an example of how pollutants can be transported by Urban Runoff. Urban Runoff pollutants can include petroleum-based compounds (such as oil and tire residue), nutrients (from fertilizers), pesticides, heavy metals (such as from electronics and batteries), sediments, and trash.

RELATED BENEFITS

Low Impact Development practices are deemed cost-effective in that they not only offer water quality improvements, but also can deliver these co-benefits:

Environmental Aesthetic. Vegetated features and permeable surfaces can be a clear expression a community's commitment to sustainability.

Peak Flow Reduction. While Urban Runoff features typically are not large enough to be flood control facilities, they do slow water from heavy rains and can reduce "peak" flow leaving the site. This helps reduce erosion and flow capacity issues in creeks. It also helps reduce flow capacity issues in storm drains.

Infiltration. Where underlying soil and subsurface water conditions permit it, vegetated features and permeable surfaces also allow "infiltration" that can recharge aquifers.

Use of Rainwater. Urban Runoff improvements can also be designed to collect and store rainwater in ways that allow it to be reused. Such infrastructure is rare, but will be explored conceptually in the Street & Open Space Improvement Plan.

DOWNTOWN OPPORTUNITIES

Urban Runoff features could be installed throughout the Downtown Area, as illustrated below and as part of design alternatives for each subarea. A "finance plan" would be developed to identify funding sources for such improvements.

HOW CAN URBAN RUNOFF BE TREATED?

In urban settings like Downtown Berkeley, there are two basic ways that run-off can be treated before it reaches local waterways. These are illustrated below:

- 1) Engineered features rely on mechanical or structural measures such as filters, vortex separators, and settling tanks. These single-purpose installations need to be maintained on a regular basis. Depending on the application, proper maintenance can result in relatively high on-going costs.
- 2) Low Impact Development (LID) describes landscape-based methods that promote cleansing infiltration through natural media (sand, gravel, soils). These measures include vegetated swales, rain gardens, and green roofs, all of which absorb Urban Runoff, allowing pollutants to settle and be filtered by the plants themselves. Permeable paving and other surfaces can also allow pollutants to settle and be filtered out by subsurface materials and microbial activity. Increasingly, LIDs are being implemented, and regulations that include LIDs are becoming the norm. The ancillary benefits of LID (discussed below) can offset the additional costs of installation and maintenance.

ENGINEERED FEATURES FILTER



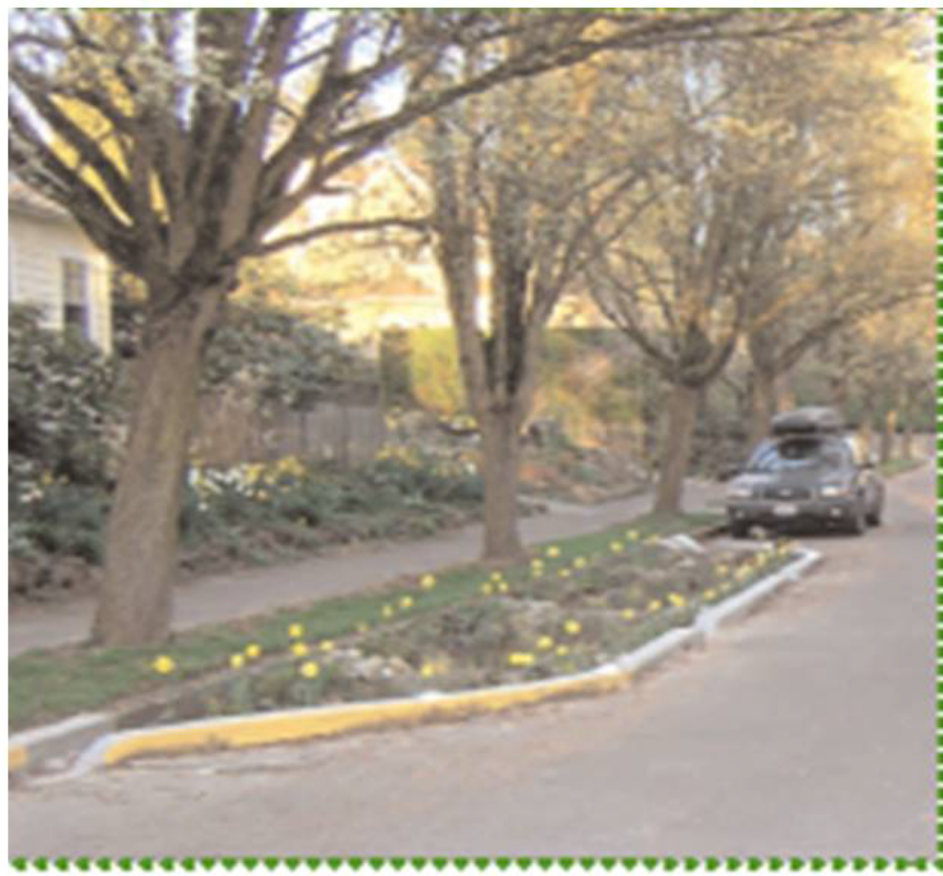
SETTLEMENT BASIN



LOW IMPACT DEVELOPMENT (LID) PERMEABLE PAVEMENT

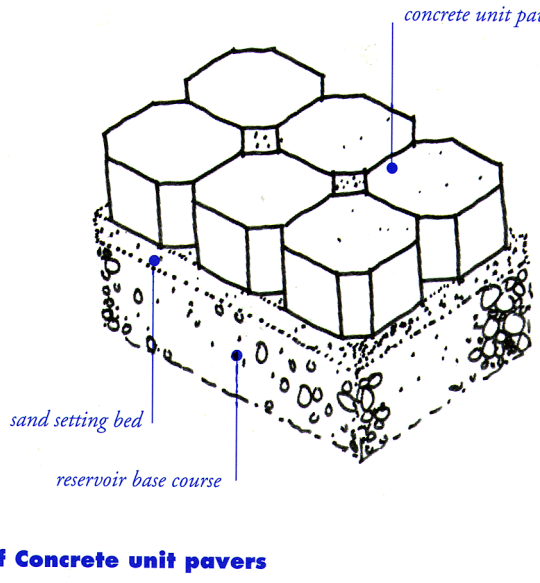


LANDSCAPE SWALES



Center Street Plaza.

Permeable paving could be installed as part of a new pedestrian plaza. The Plaza could also contain water features that reference Strawberry Creek, which enters culvert just east of Oxford.



Lower Shattuck / Park Blocks

A linear "Eco-Park" could be created if traffic and parking are reconfigured within the wide Shattuck right-of-way. The Eco-Park could contain vegetated swales, shallow ponds and other features -- for ecological benefits, educational programs, and the community's enjoyment.



Existing streetscape between Channing and Haste, looking Southeast.



Photo simulation with Park Blocks.

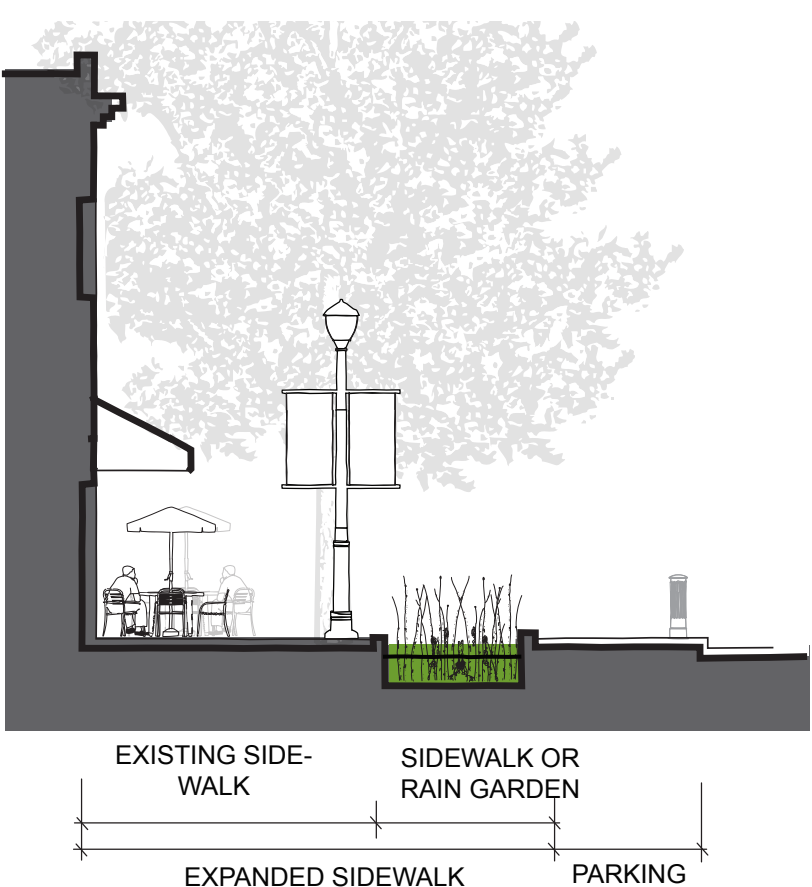
Hearst Avenue / Ohlone Greenway Extension.

Travel lanes could be eliminated and would provide sufficient dimension for installing vegetated swales in some locations.



University Avenue, Shattuck Avenue & Center Street Greenway.

University Avenue, Shattuck Avenue & Center Street Greenway. Many street segments could be reconfigured to widen sidewalks and create "rain gardens" (a narrower relative of vegetated swales). "Rain gardens" have been installed by several cities and yield environmental and aesthetic benefits.



Incremental Improvements.

Small improvements could also treat Urban Runoff and enhance the Downtown. Individual street tree installations could be designed to accept Urban Runoff; permeable pavers could be used when sidewalks are widened or replaced; and, road surfaces could utilize a variety of permeable surface options.